

S
631.64
L3bmp
1987

FINAL REPORT

BN-S MINE PROJECT
DANIELS COUNTY, MONTANA
MT A/E 86-46-109

SEPTEMBER, 1987


STATE DOCUMENTS COLLECTION

JAN 23 2001

MONTANA STATE LIBRARY
1515 E. 6th AVE.
HELENA, MONTANA 59620

L. C. HANSON COMPANY

CONSULTING ENGINEERS & SURVEYORS
HELENA — GREAT FALLS — GLENDIVE

MONTANA STATE LIBRARY

3 0864 0015 7039 2



FINAL REPORT

BN-S MINE PROJECT
DANIELS COUNTY, MONTANA
MT A/E 86-46-109

SEPTEMBER, 1987


Prepared for: MR. RICHARD JUNTUNEN, CHIEF
Abandoned Mine Reclamation
Bureau
Department of State Lands
1625 11th Avenue
Helena, MT 59620

Prepared by: L.C. HANSON COMPANY
Consulting Engineers
PO Box 299
3108 McHugh Lane
Helena, MT 59624

Allan W. Nye, P.E.
Project Engineer

William F. Shaw, C.E.T.
Project Inspector

L. C. HANSON COMPANY
CONSULTING ENGINEERS & SURVEYORS
HELENA — GREAT FALLS — GLENDIVE



Digitized by the Internet Archive
in 2016

<https://archive.org/details/finalreportbnsmi1987lcha>

FINAL REPORT

BN-S MINE RECLAMATION PROJECT

I. INTRODUCTION

A. Project Objectives:

The BN-S MINE Reclamation Project was undertaken at the site of six partially-collapsed abandoned coal mines where a County Road had been constructed over a greatly undermined area. The project was undertaken to reclaim the surfaces of the mined areas and relocate the County Road to an area beyond the limits of the mined area. The objective of the project was the elimination of discernible hazards to public safety and the return of the surface of the mined areas to a condition similar to the surrounding undisturbed environment.

B. Project Location:

The BN-S project is located eight miles northwest of Scobey, Montana in Daniels County. The project location is further described as follows: S 1/2, SW 1/4 Section 27 and E 1/2, SE 1/4 Section 28 and N 1/2, NW 1/4 Section 34 and NE 1/4, NE 1/4 Section 33 all of T37N, R47E.

C. Site Description:

The BN-S Mine site encompasses mining operations at six different locations. One mine is located in each of Sections 27 and 34. Two mines are located in each of Sections 28 and 33. A County Road has been constructed over the largest of the mined areas in Section 34 and had been shifted, in the recent past, approximately 100 feet north, due to the collapse of the underground workings.

The terrain in the area is rugged and sparsely vegetated. Native grasses and juniper inhabit the majority of the mined area north of the County Road, which is used as cattle rangeland. The N 1/2, NW 1/4 of Section 34 is cultivated land.

The remains of seven adits and eleven air shafts were unreclaimed; one adit and three air shafts remained open to the underground workings. All of the adits were marked with enormous amounts of coal slack which were spread over large areas. The airshafts had become partially concealed with brush.

Many subsidence holes, slump areas and fissures marked the

surface of the undermined areas. At two locations, the collapse of the workings occurred beneath drainage channels. Water runoff exacerbated the collapse, resulting in very large subsidence holes. One such area, adjacent to the County Road in Section 34, had been used by the public as a garbage dump, which resulted in debris spread over a large area.

II. DESCRIPTION OF RECLAMATION PROJECT

A. Project Planning:

Administration and Funding - Funding for the reclamation, planning and administration of the BN-S MINE Reclamation Project was provided through a grant from the United States Department of the Interior, Office of Surface Mining. The Montana Department of State Lands, Abandoned Mine Reclamation Bureau administered the grant. L.C. Hanson Company prepared the reclamation plan and also administered the construction Contract, performed on-site inspection of construction and acted as the Department of State Lands' on-site representative.

Preliminaries - Planning for this project was based on site visits and aerial and ground photography. The Department of State Lands conducted the initial site investigation in 1983. The result of this and visits in October of 1985 was aerial photos which were used to produce topographic mapping. An historical review was also conducted during these investigations to insure that artifacts of historical significance were not inadvertently lost or destroyed during reclamation.

In January of 1985, members of L.C. Hanson Company visited the site to drill a series of eight boreholes along the County Road. They also made a courthouse records search in Scobey, MT to verify the legal description of the project area and identify the titled landowners. Mine maps for three of the mines were also found.

L.C. Hanson Company commenced compilation of preliminary engineering plans in August of 1985. This work included a site visit from the designer to verify the topographic and planimetric scale of the mapping and also verify the surface features shown on the mapping. The three mine maps available are for Mines A, D and F. These maps in conjunction with the topographic mapping and ground surveys were used in planning to make the following mine designations:

<u>Mine</u>	<u>Location</u>
A	Furthest north in Section 28
B	Furthest south in Section 28
C	Furthest north in Section 33
D	Section 27
E	Furthest south in Section 33
F	Section 34

The mapping of Mine F and the topographic mapping correlated to show that the existing County Road lay directly over Mine F. The borehole drilling performed along the road proved the existence of mined rooms beneath the roadway. Based on three findings, several options were assessed. These included: subsurface reclamation to locate and backfill the mine void beneath the roadway; and abandonment of a portion of the existing roadway and construction of a new road along the southern perimeter of Mine F. Relocation of the roadway proved by far the most economical and, because the area was remote and contained no major structures, it was also the most practical.

In October of 1985, the preliminary plans were completed and in November of 1985, the Department of State Lands conducted a public hearing in Scobey, MT, where the preliminary plans were presented.

The owner of the N 1/2, NW 1/4 of Section 34 opposed the proposed plan. The owner's objections included: opposition to the use of Federal monies to reclaim abandoned coal mines; belief that the abandoned mines in the area were not a hazard to public safety; and opposition to the use of an area in the NW 1/4 of Section 34 for relocation of the County Road, which would result in the loss of approximately four cultivated acres to the roadbed location and divide the cultivated area, placing approximately ten cultivated acres north of the new road. Efforts to overcome the owner's objections and arrive at a reasonable settlement for anticipated losses in agricultural production involved many meetings, much correspondence, and an independent appraisal of land value. These negotiations were concluded in late May of 1986.

In the meantime, an L.C. Hanson Company survey party visited the site in December of 1985 to check the centerline of the proposed new road and the preliminary road cross-sections. The final engineering was completed and the bid documents and Contract fully assembled and approved by all parties in early June, 1986.

B. Project Scope:

The reclamation prescribed for the BN-S MINE Reclamation Project included: construction of approximately 3100 L.F. of new road; obliteration of a portion of the existing County Road; the gathering and disposal of debris; salvaging and replacing topsoil in all work areas; closing all adits and air shafts; disposing of waste piles; backfilling subsidence holes and slump areas; reestablishing vegetation throughout all disturbed areas; and constructing a new fence.

C. The Reclamation Plan:

The BN-S reclamation plan divided the project into two work schedules. Schedule I involved the road work and Schedule II involved the surface reclamation of the mined areas.

Following is a delineation of the work items included in each Schedule.

Work Items - Schedule I

Traffic Control - Install traffic control signing and provide flagmen.

Salvage and Replace Topsoil - Excavate and stockpile topsoil from the area of the new road and embankment of the existing road and spread topsoil in the area of the new road embankment and the surface of the obliterated roadway.

Excavation Above Subgrade - Excavate, haul, place, moisture condition and compact the subsoil used to construct the new road embankment.

Excavation Below Subgrade - Excavate and waste unsuitable subsoil materials found in the subgrade embankment.

Base Course - Provide, haul, place and compact four inches of 1-1/2 inch minus gravel.

Surfacing Course - Provide, haul, place and compact two inches of 3/4 inch minus gravel.

Traffic Signs - Provide and permanently install four traffic control signs.

Remove Fence - Remove the existing fence along the portion of the existing road scheduled for obliteration.

Obliterate Roadway - Regrade the area of old roadway to match the adjacent undisturbed surface contours.

Farm Fence - Construct a new fence adjacent to the new road and along a portion of the north and east border of Section 34.

Landowner Settlement - Pay encroachment mitigation and construct a new grain bin.

Work Items - Schedule II

Debris Cleanup - Gather all debris. Burn or dispose off-site all biodegradable debris. Bury all debris. Salvage certain designated mining artifacts and transport them to Scobey, MT.

Salvage and Replace Topsoil - Excavate, stockpile and spread topsoil in areas where backfilling, waste pile disposal or borrow is performed.

Close Mine Openings - Backfill the air shaft and adits.

Subsidence Backfill - Backfill designated subsidence holes with material cut and hauled from borrow areas or waste piles.

Special Grading - Regrade the high wall embankment surrounding Adit C to produce a slope of approximately 3:1.

Waste Pile Disposal - Excavate designated coal slack piles and haul and place the waste material in adjacent subsidence holes.

Provide Water - Provide and spread water for compaction in surface reclamation fill areas.

Lime Placement - Provide and spread lime in area where the waste piles have been removed from the surface.

Revegetate - Apply fertilizer, seed and mulch to all disturbed areas.

D. Construction Phase:

Schedule of Events - The following delineation of events tracks the construction phase of the project from bidding to final completion.

June 27, 1986 - The Montana Department of Administration issues an Invitation for Bids.

July 16, 1986 - L.C. Hanson Company conducts a Pre-Bid Conference at the site. A representative of the Department

of State Lands and representatives from 15 construction firms are in attendance.

July 29, 1986 - The Department of Administration opens the 12 bids received.

July 30, 1986 - A Notice of Award is issued to Gary Morlock Construction, Inc., Sidney, MT as the successful low bidder.

August 21, 1986 - L.C. Hanson Company conducts a Pre-Construction Conference at the site. Attendees include L.C. Hanson Co.; Gary Morlock Construction, Inc.; Daniels County Road Foreman; and Daniels County Weed Supervisor. A Notice to Proceed is issued to Gary Morlock Construction, Inc., they have successfully met all bonding and insurance requirements.

August 25, 1986 - Construction commences.

October 29, 1986 - Pay Request No. 1 is issued.

November 14, 1986 - (Date of Substantial Completion) The majority of work in Schedule I and Schedule II is completed; remaining work consists of revegetation and fencing.

December 5, 1986 - L.C. Hanson Company issued Gary Morlock Construction, Inc. a Notice of Temporary Shutdown for the duration of the winter.

December 8, 1986 - Pay Request No. 2 is issued.

April 8, 1987 - Gary Morlock Construction resumes work on the project.

June 6, 1987 - All required work is completed.

June 26, 1987 - Department of State Lands conducts a final inspection of the completed project.

August 19, 1987 - The project is accepted as complete and Final Payment is made.

E. Equipment:

Backhoe - John Deere 690, track-mounted, 3/4 C.Y.

Dozer - Cat D7G, track-mounted, 12 foot blade

Water Tanker - Tractor tandem-mounted tank, 6000 Gal

Water Truck - Truck-mounted tank, 3200 Gal

Scraper - 3-Cat 627B, twin engine, 18 C.Y.

Compaction Equipment - Twin drum sheepfoot roller and John Deere 4010 tractor. Twin-axle wheel roller.

Blade - John Deere 772A, 6-wheel drive

F. Work Description:

Much of the BN-S MINE project work in Schedule I and Schedule II was performed concurrently. Construction work on the BN-S MINE project commenced with the stripping of topsoil from the new roadway and subsidence holes.

On the new roadway, three Cat scrapers were used to remove the topsoil from the roadway site and stockpile the material at three locations north of the new roadway.

The construction of the new road subgrade required the coordination of seven pieces of equipment in three operations. The sequence of operations required that first the scrapers excavate subsoil materials from designated cut areas along the new road, and then deliver the material to designated fill areas. After a fairly uniform 8 inch lift had been placed in a section of the road, the scrapers were moved to other road sections to place succeeding lifts.

Second, the lift was moisture conditioned using the tanker and water truck equipped with spray bars. In road sections where the subgrade was being shaped by borrow operations, the subsoil was scarified prior to the placement of water. As water was being placed on the embankment, the blade was used to mix it into the soil. At the conclusion of this operation the embankment was uniform and ready for compaction.

In the third operation the sheepfoot roller was used to compact the embankment to 95% of maximum dry density while all other equipment worked at other sections of the road.

Two subsoil types - sandy silt and clayey silt - were used throughout the subgrade. At the commencement of construction, the on-site Engineer delivered samples of these soils to a soils laboratory. Testing of these materials concluded that the maximum dry density was 111.0 lbs. per c.f. for sandy silt and 106.0 lbs. per c.f. for clayey silt. It was also determined that these densities could be achieved with the least compactive effort if the moisture content were 15% and 18% respectively.

After all portions of the embankment were completed, the survey team returned to the project to install the final subgrade elevation control. These "blue top" stakes were placed on both shoulders of the new road. The blade was then used to cut and fill minor discrepancies in the road surface to achieve the final subgrade elevation. With the completion of this operation, the subgrade was now ready for the surface courses.

The first course - base course - consisted of 4 inches of 1-1/2 minus crushed gravel. This material was delivered to the site from a pit located 5 miles east of Scobey. This material was dumped in a windrow following the centerline of the new road. The blade was then used to process the material to eliminate any segregation and distribute it evenly in the windrow. The blade was also used to spread the material in a 4-inch lift across the entire surface. After spreading, the base course was compacted using a smooth wheel roller.

The second course - surface course - consisted of 3/4 minus crushed gravel. It was treated in the same manner as the first course, but was spread to a consistent depth of 2 inches.

Throughout the embankment construction and surfacing, the on-site Engineer conducted 68 nuclear densometer tests. These compaction and moisture tests were conducted on successive lifts at various locations throughout the road. This equipment was capable of measuring the density of the embankment to a depth of 8 inches.

While work on the road progressed, the backhoe was used to remove topsoil from the subsidence holes and stockpile the material adjacent to the holes. At some hole locations, it was necessary to use the dozer to gather the material into stockpiles. The backhoe was also used to close Adits C and D.

All the debris from the site was gathered and piled adjacent to the major subsidence at Mine F. The biodegradable material was burned and the other material was crushed prior to burial.

At some stages of road construction, the work area became too congested to fully utilize the available equipment. During these periods, the equipment was diverted to the other work. The scrapers were used to strip and stockpile the topsoil from two borrow areas; haul and place backfill material in subsidence holes and adits; and excavate, haul and dispose of waste piles.

Coal slack waste piles were excavated at Mine A and D, and from three different locations at Mine F. The disposal of these materials presented several problems. From the surface appearance, the piles looked to be approximately 1 foot deep, at most; however, as excavation progressed, it became apparent that the material was as deep as 3 feet. This presented problems because some of the areas scheduled to be used as disposal points simply could not hold all the

waste; therefore, points more distant from the piles had to be used. Delivery of the material to these points meant that more haul roads were blackened from the equipment tracking the coal slack and spillage from the haul units. Much of the waste piles were located in the bottom of drainage channels. Over the years since the deposit of the waste, erosion and deposition had established a new channel gradient. This presented problems because excavation of this depth resulted in water ponding areas within the channel. To eliminate the ponding areas, the work limits had to be extended down the channel, which resulted in more disturbed area than previously anticipated.

The areas used to dispose of waste pile material included the subsidence holes at Mine B for the disposal of the waste pile at Mine A; the largest of the subsidence holes at Mine F for the disposal of waste from several areas in Mine F; and the Special Grading area at Adit C for the material gathered from Adit D and one of the adits of Mine F.

The Special Grading Area involved the elimination of a high wall into which the adit for Mine C had been made. A 4:1 slope was established along the entire face of the wall. Much of the fill material consisted of coal slack which was covered by caving the upper portions of the wall.

The availability of topsoil was a problem at Adit A, B, D, and E and F and the Special Grading Area. This was partially resolved by redistributing the available topsoil already stockpiled. The additional topsoil was borrowed from channel bottoms where coal slack had been removed.

Prior to Winter Shutdown, the Contractor had successfully completed all major work items. The remaining work consisted of applying fertilizer, seed and mulch to all disturbed areas and constructing a farm fence north of the new road in Section 34.

In the Spring of 1987, the landowner of Sections 27 and 28 informed L.C. Hanson Company that he would be ranging cattle in the area of the mine surface reclamation. At the time of planning the area had been experiencing a drought and the landowner had not planned to range livestock in the area; however, the unusually high rainfall in the Fall of 1986 had changed his mind. L.C. Hanson Company reviewed the options of permanent fence, reseeding and electric fence. The electric fence proved the most economical.

In April of 1987 the Contractor completed the revegetation and permanent fence, and in May he completed the electric fence.

III. COST AND QUANTITY SUMMARY

A. Final Payment Request and Reconciliation Change Order:

A copy of the Final Payment Request and Reconciliation Change Order are contained in Appendix A. These documents summarize the final quantities and costs for each work item.

B. Change Orders:

The following Change Order was executed during the course of the project:

Change Order No. 1 - Construction of electric fencing at four locations in Sections 27 and 28 and Reconciliation of Final Quantities.

C. Cost Delineated by Work Area:

Table 1 below shows the work location, work items, area and costs involved in the BN-S Mine Reclamation Project for Schedule II (mine surface reclamation)

WORK AREA	WORK ITEM COST:DOLLARS	TOTAL COST	AREA ACRES	COST/ ACRE
Entire site:	Debris Cleanup Lump Sum	4800	30.0	160.00
Mine A	Revegetation Topsoil Close Adit Close Shaft Subsidence Bkfill Provide Water Waste Pile Disposal Lime Placement	730.59 2156.93 400.00 600.00 19.00 384.00 447.98 1125.00		
		5863.50	.9	6515.00
Mine B	Revegetation Topsoil Close Adit Subsidence Bkfill Provide Water	979.65 870.35 400.00 1273.00 1176.00		
		4699.00	1.2	3915.00

WORK AREA	WORK ITEM COST:DOLLARS	TOTAL COST	AREA ACRES	COST/ ACRE
Mine C	Revegetation	476.54		
	Topsoil	574.20		
	Close Adit	400.00		
	Close Shaft	300.00		
	Subsidence Bkfill	1151.00		
		2901.74	0.57	5090.77
Mine D	Revegetation	328.77		
	Topsoil	910.75		
	Close Adit	400.00		
	Close Shaft	600.00		
	Waste Pile Disposal	236.21		
	Lime Placement	450.00		
		2925.73	0.4	7314.33
Mine E	Revegetation	429.22		
	Topsoil	62.13		
	Close Adit	400.00		
	Close Shaft	600.00		
	Subsidence Bkfill	145.00		
		1636.35	0.52	3146.83
Mine F	Revegetation	2839.33		
	Topsoil	5516.28		
	Close Adit	400.00		
	Close Shaft	2400.00		
	Subsidence Bkfill	748.00		
	Waste Pile			
	Disposal	2063.40		
	Lime Placement	3425.00		
		17392.01	3.4	5115.30
Borrow #1	Revegetation	484.02		
	Topsoil	237.50		
		721.52	0.58	1244.00
Borrow #2	Revegetation	611.04		
	Topsoil	454.00		
		1065.04	.74	1439.24

Special	Revegetation	846.82		
Grading	Topsoil	547.50	(haul cost only)	
	Lump Sum	2000.00		
		3394.32	1.0	3394.32

D. Cost Delineated by Work Item:

Table 2 below shows the work items, quantities, total cost and costs per acre involved in the BN-S MINE Reclamation Project.

SCHEDULE I (Road Relocation)

WORK ITEM	QUANTITY	COST (DOLLARS)		
		PER UNIT	TOTAL: 29 Acres Disturbed	PER ACRE:
Mobilization	Lump Sum	4000.00	4000.00	138.00
			Per 28 Stations:	
Encroachment				
Mitigation	Lump Sum	2275.00	2275.00	81.00
Traffic Control	Lump Sum	550.00	550.00	20.00
Salvage & Replace				
Topsoil	4289.0 C.Y.	2.00	8578.00	306.00
Excavation above				
Subgrade	20832.0 C.Y.	.65	13540.00	484.00
Excavation below				
Subgrade	342.0	2.00	684.00	24.00
1-1/2 inch minus				
Base Course	1207.0 C.Y.	9.50	11466.50	410.00
3/4 inch minus				
Surface Course	4.0 Each	60.00	240.00	8.50
			Per 31 Acres Enclosed	
Remove Fence	2020.0 L.F.	0.50	1010.00	33.00
Obliterate				
Roadway	23.0 Station	100.00	2300.00	74.00
Farm Fence	4906.0 L.F.	1.25	6132.50	198.00
Single Panel	6.0 Each	75.00	450.00	15.00
Double Panel	8.0 Each	110.00	880.00	28.00
Corner Panel	2.0 Each	100.00	200.00	7.00
Farm Gate	16.0 L.F.	3.00	48.00	1.50
Metal Gate	24.0 L.F.	8.00	192.00	6.00
Grain Bin	Lump Sum	3060.00	3060.00	N/A

Schedule I Subtotal \$61,145.80

Per 4 acres within the road right of way: 15,286.00

Per 35 acres involved in road relocation: 1,747.00

Schedule II (Mine Surface Reclamation)

WORK ITEM	QUANTITY	COST (DOLLARS)		PER ACRE:
		PER UNIT	TOTAL:	
27.4 Acres Disturbed				
Salvage Mining				
Artifacts	Lump Sum	500.00	500.00	18.00
Debris Cleanup	Lump Sum	4800.00	4800.00	175.00
Salvage & Replace				
Topsoil	4721.4 C.Y.	2.50	11803.50	431.00
Close Mine Opening				
-Adit-	7.0 Each	400.00	2800.00	102.00
Close Mine Opening				
-Shaft-	11.0 Each	300.00	3300.00	120.00
Subsidence				
Backfill	3883.5 C.Y.	1.00	3883.50	142.00
Special Grading	Lump Sum	2000.00	2000.00	73.00
Waste Pile				
Disposal	Lump Sum	2715.00	2715.00	99.00
Provide Water	52.0 MGal	30.00	1560.00	57.00
Lime Placement	2.0 Acre	2500.00	5000.00	183.00
Seed	575.4 Lbs	13.00	7480.00	273.00
Fertilizer	2350.0 Lbs	1.25	2937.50	107.00
Mulch	82.170.0 Lbs	.15	12325.50	450.00
Schedule II Subtotal			\$61,105.20	\$2,230.00

Change Order No. 1

WORK ITEM	COST(DOLLARS)	PER L.F.		PER ACRE:
		5648.0 L.F.		
Electric Fence				
Contractor supplied material	918.00	.16		26.00
Contractor labor	2372.16	.42		68.00
Change Order No. 1 Subtotal	3290.16	.58		94.00
Owner-provided material (estimate)				
	1500.00	.27		43.00
Electric Fence - TOTAL -	4790.16	.85		137.00

IV. SUMMARY

A. Accomplishments:

This project was successfully completed within the allotted time and within the Engineer's cost estimate. It successfully achieved the objectives of eliminating the discernible hazards to public safety, returned the area to a usable condition, and restored the environment.

The Montana Department of State Lands will continue to monitor the site to determine if additional reclamation is required.

B. Engineer's Comments:

Field Engineers Comments - The single most important factor which affected the construction of this project was inclement weather. On September 5, a rainy season set in and lasted for seven weeks. During this period over 7 inches of rain fell and 36 working days were lost.

The heavy rain not only prevented continued work but damaged several sections of the new road. Approximately 50 L.F. of road at each of the Stations 13+00 and 9+50, and 250 L.F. at Station 32+00 were thoroughly saturated. Over two feet of the new embankment had to be cut at each of the areas. The fill material at Stations 9+50 and 32+00 was cut and spread along the roadway, worked with a blade until it was within the proper moisture content limits, and recompactd into the fill.

The embankment at Station 13+00 is located at the base of a major borrow area and was constructed by cutting instead of filling. For this reason the underlying material had not been exposed prior to the construction of the embankment. When the unstable embankment was cut, it was discovered that the area was underlain with a pocket of heavy clays. This material was cut away and wasted in an adjacent subsidence hole and a new embankment constructed from material more suitable.

The working relationship of the on-site personnel is an important aspect of the success of every construction project. The Field Engineer and the construction crew partially misconstrue each other's role in the construction process when they view those roles as wholly adversarial. On this project, a misunderstanding was apparent at the start of road construction when the Field Engineer addressed road construction requirements to crew members in terms of "optimum moisture content", "percent of maximum density",

and "nuclear densometer test results." Crew members tended to view these as arbitrary numbers for setting unobtainable requirements and the densometer as a machine for generating data which would frustrate attempts to achieve the requirements. Much of the problem was resolved with a meeting between the Field Engineer and the crew during which the laboratory testing procedures for determining optimum moisture and maximum density were explained to assure them that these were not arbitrary numbers, nor the requirements unobtainable. The meeting also discussed the previous day's efforts to acquaint the crew with the benefits of the densometer test results. The examples discussed included various sections of fill which had been carefully recorded for the amount of water applied and the amount of compactive effort that had been exerted to achieve the required density. The good results of the meeting became obvious thereafter, when crew members frequently requested testing, often helping the Field Engineer conduct the tests.

The Contractor, the Construction Supervisor, and the crew did a commendable job, having successfully completed all major work items in 38 working days.

V. SLIDES

The slide logs and slides are contained in Appendix B.

SLIDE AND PHOTO LOG

BN-S MINE PROJECT

SLIDE NO.	DESCRIPTION
A1-A2	Salvaging and stockpiling topsoil from new road.
A3-A14	New road construction including: water application, borrowing fill material, grading and compacting the embankment.
A15-A16	Disposal of coal slack at Mine A.
A17	Salvaging topsoil from the west subsidences of Mine F.
A18	Salvaging topsoil from the west subsidences of Adit E.
A19-A20	Closing Adit G.
B1-B17	Area of new road prior to construction.
B18-B19	Area of Mines A and B prior to reclamation.
C1-C3	Shaft closure using scraper.
C4	Scraper loading.
C5	Biodegradable debris disposal at Mine F.
C6	Area at Mine A after waste pile disposal.
C7-C9	Backfilling subsidence holes at Mine B from Borrow #1, after waste from Adit A has been deposited.
C10	Backfilling subsidence holes at Mine C.
C11-C12	Deposition of coal slack at Special Grading Area.
C13	Removal of coal slack waste at Mine F.
C14	Adit E closed and backfilled.

C15-C16	West portion of Mine F subsidence holes after completion of waste pile removal and debris cleanup.
C17-C19	Topsoil spreading on completed portions of Mines A and F, and the area of the obliterated portion of the County Road.
D1	Scrapers loading using "push-pull" method.
D2-D4	Removal of unsuitable embankment materials.
D5-D8	Final grading of the embankment subgrade.
D9-D14	Placing, processing, and compacting the surfacing courses.
D15-D20	Obliteration of the old road.
E1-E5	Regrading the Special Grading Area.
E6-E15	Revegetation of all disturbed areas.

APPENDIX A

Payment Request No. 4
(Final)

From: May 9, 1987

To: June 15, 1987

Project Name: BN-S Mine Project

Location: Daniels Co. Mt.

Project No.: Mont A/E 86-46-109

Name Of Contractor: Gary Morlock Const. Address: PO Box 1408 Sidney, Mt 59270

Summary Of Project Status

Amount of Original Contract \$119,178.05

Amount of Approved Change Order(s) 6,363.11

TOTAL CONTRACT AMOUNT 125,541.16

Contract Time Used to Date 59 Days

Percentage of Contract Time Used 38%

Percentage of Contract Amount Earned 100%

RECEIVED

AUG 17 1987

STATE LANDS

RECEIVED

AUG 18 1987

LOWELL C. HANSON CO.

Original Contract Amount Completed 122,251.00

Change Order(s) Amount Completed 3,290.16

Amount for Materials On Site 0.00

TOTAL To Date 125,541.16

Times 90% = No Retainage

TOTAL AMOUNT Earned To Date 125,541.16

Less Previous Amount Earned 122,251.00

Amount Payable This Period 3,290.16

Less 1% Gross Receipts Tax 32.90

TOTAL DUE CONTRACTOR THIS PERIOD \$3,257.26

Requested By: Gary Morlock Const.

(Contractor)

Date: 6/11/87

Checked By: L.C. Hanson Co.

(Engineer)

Date: 8/19/87

Approved By: Department of State Lands

Abandoned Mine Reclamation Bureau

(Owner)

Date: 8/17/87

PAY REQUEST NO. 4

L.C. Hanson Co.

PROJECT: BN-S Mine Project

MONT A/E 86-46-109

Page 2 of 6

ITEMIZATION OF QUANTITIES AND COSTS

ITEM NO.	DESCRIPTION	ESTIMATED PLAN QUANTITY	UNIT BID PRICE	UNITS OF WORK COMPLETED THIS REQUEST	UNITS OF WORK COMPLETED TO DATE	TOTAL COST OF COMPLETED WORK	% OF EST. QUANT. COMP.
1	Mobilization	1.0 Lump Sum	4000.00	0.00	1.00	4000.00	100%
2	Encroachment Mitigation	1.0 Lump Sum	2275.00	0.00	1.00	2275.00	100%
3	Traffic Control	1.0 Lump Sum	550.00	0.00	1.00	550.00	100%
4	Salvage & Replace Topsoil	4610.0 C.Y.	2.00	0.00	4289.00	8578.00	100%
5	Unclass. Excav. Above Sub	18112.0 C.Y.	0.65	0.00	20832.00	13540.80	100%
6	Excavation Below Subgrade	20.0 C.Y.	2.00	0.00	342.00	684.00	100%
7	1 1/2" Minus Crushed B.C.	1207.0 C.Y.	9.50	0.00	1207.00	11466.50	100%
8	3/4" M.C. Surface Course	580.0 C.Y.	9.55	0.00	580.00	5539.00	100%
9	Traffic Control Signs	4.0 Ea.	60.00	0.00	4.00	240.00	100%
10	Remove Fence	1900.0 L.F.	0.50	0.00	2020.00	1010.00	100%
11	Obliterate Roadway	23.0 Stat	100.00	0.00	23.00	2300.00	100%
12	Farm Fence - F3W	5030.0 L.F.	1.25	0.00	4906.00	6132.50	100%
13	Single Panel	9.0 Ea.	75.00	0.00	6.00	450.00	100%
14	Double Panel	6.0 Ea.	110.00	0.00	8.00	880.00	100%
15	Corner Panel	3.0 Ea.	100.00	0.00	2.00	200.00	100%
16	Farm Gate -Type G-2	16.0 L.F.	3.00	0.00	16.00	48.00	100%
	Sub-Total					57893.80	

* Work completed on this item

RECEIVED
AUG 17 1987
STATE LANDS

L.C. Hanson Co.

MONI A/E 86-46-109

Page 3 of 6

ITEM NO.	DESCRIPTION	ESTIMATED PLAN QUANTITY	UNIT BID PRICE	UNITS OF WORK COMPLETED THIS REQUEST	UNITS OF WORK COMPLETED TO DATE	TOTAL COST OF COMPLETED WORK	% OF EST. QUANT. COMP.
17	Metal Gate	24.0 L.F.	8.00	0.00	24.00	192.00	100%
18	Grain Bin, 2200 Bushel	1.0 Lump Sum	3060.00	0.00	1.00	3060.00	100%
	Capacity, Complete						
	Sub-Total					3252.00	
	Total Schedule I					61145.80	

RECEIVED
AUG 17 1987
STATE LANDS

PAY REQUEST NO. 4

L.C. Hanson Co.

PROJECT: SN-5 MINE PROJECT

MONT A/E 96-46-109

Page 5 of 6

ITEMIZATION OF QUANTITIES AND COSTS

ITEM NO.	DESCRIPTION	ESTIMATED PLAN QUANTITY	UNIT BID PRICE	UNITS OF WORK COMPLETED THIS REQUEST	UNITS OF WORK COMPLETED TO DATE	TOTAL COST OF COMPLETED WORK	% OF EST. QUANT. COMP.
	Change Order No. 1						
1	Reconciliation of Final Quantities					3072.95	100%
2	Install electric fence (4 sites). Department of State Lands to furnish all materials except the following:						
	a. Sears Diehard R/V						
	Marine Deep Cycle Battery, 675 CCA	4.0 Each	120.00	4.00	4.00	480.00	100%
	b. Wood Terminal Posts, 6' long	26.0 Each	15.00	26.00	26.00	390.00	100%
	Sub-Total					3942.95	

* Work completed on this item

RECEIVED
AUG 17 1987
STATE LANDS

PAY REQUEST NO. 4
L.C. Hanson Co.

L.C. Hanson Co.

PROJECT: BN-S NINE PROJECT

MCNT A/E 26-46-109

Page 6 Of 6

ITEMIZATION OF QUANTITIES AND COSTS

[illegible]

1 Work Completed on this item

RECEIVED
AUG 17 1987
STATE LANDS

REF IDSECTION II

2.12 CHANGE ORDER

Order No. 1

AUG 25 1987

Date: June 15, 1987

LOWELL C. HANSON CO.

Agreement Date: July 31, 1986NAME OF PROJECT: BN-S MINE PROJECTDaniels County, MT MT A/E 86-46-109OWNER: Montana Dept. of State Lands - AMR BureauCONTRACTOR: Morlock Construction PO Box 1408 Sidney, MT 59270

Change Orders must be accompanied by an itemized cost breakdown. You are hereby requested to comply with the following changes from the Contract Documents. (Show separate costs for materials, labor, equipment and miscellaneous. Show percent where applicable.)

ITEM NO.	DESCRIPTION OF CHANGES - ESTIMATED QUANTITIES & UNITS	COST OF CHANGES					TOTAL COST
		MAT'LS	LABOR	EQUIP.	MISC.	TOTAL UNIT COST	
1.	Reconciliation of Final Quantities (SEE ATTACHED SHEETS)						+\$ 3,072.95
2.	Install Electric Fence (4 sites) as staked in the field on the Melvin Stai property. The Department of State Lands has furnished all materials to be installed with the exception of the following, which are to be furnished by the Contractor at the noted prices (See Attached)						+\$ 3,290.16
TOTAL COST - MAT'LS, LABOR, EQUIPMENT & MISC.							
OVERHEAD & PROFIT @ _____ %							
GRAND TOTAL - THIS CHANGE ORDER							

Original Contract Price

\$ 119,178.05

Current Contract Price Adjusted by Previous Change Order

0.00

Cost This Change Order (+ or -)

+ 5,363.11

New Contract Price Including This Change Order

\$ 125,541.15

The completion date as set forth in the Contract Documents shall be (~~unchanged~~, increased, ~~decreased~~) by FIVE (5) calendar days.

The date for completion of all work will be _____.

Description and Justification for Change:

1. The actual quantities shown were necessary to meet field conditions encountered during construction.
2. The Landowner requested fencing of the revegetated areas to prevent his cattle from destroying the seeded areas.

SURETY CONSENT

The surety hereby consents to the aforementioned Contract Change Order and agrees that its bond or bonds shall apply and extend to the Contract as thereby modified or amended per this Change Order. The principal and the Surety further agree that on or after execution of this consent, the penalty of the applicable Performance Bond or Bonds is hereby increased by _____

(\$ _____) (One hundred percent (100%) of the Change Order amount) and the penalty of the applicable Payment Bond or Bonds is hereby increased by _____ (\$ _____)

(One hundred percent (100%) of the Change Order amount).

COUNTERSIGNED BY MONTANA RESIDENT AGENT

SURETY

BY: _____

(Seal)

Recommended by: L. C. Hanson Company Albert W. Hys, Engineer 8/18/87
Accepted by: Gary Morlock Const., Inc. Gary Morlock, Contractor 8/19/87
Approved by: Richard J. Hunt, Owner 8/24/87

1. (cont'd)

SCHEDULE I		RECONCILIATION OF FINAL QUANTITIES		NEW ROADWAY CONSTRUCTION
ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	ACTUAL QUANTITY	CHANGE IN PRICE
4.	Salvage & Replace Topsoil	4610 C.Y.	4289 C.Y.	-\$ 642.00
5.	Unclassified Excavation Above Subgrade	18112 C.Y.	20832 C.Y.	+ 1,768.00
6.	Excavation Below Subgrade	20 C.Y.	342 C.Y.	+ 644.00
10.	Remove Fence	1900 L.F.	2020 L.F.	+ 60.00
12.	Farm Fence - F3W	5030 L.F.	4906 L.F.	- 155.00
13.	Single Panel	9 Each	6 Each	- 225.00
14.	Double Panel	6 Each	8 Each	+ 220.00
15.	Corner Panel	3 Each	2 Each	- 100.00
Sub-Total Schedule I				+\$ 1,570.00
SCHEDULE II		SURFACE RECLAMATION		
3.	Salvage & Replace Topsoil	1195 C.Y.	4721 C.Y.	+\$ 8,816.00
5.	Subsidence Backfill	8457 C.Y.	3883.5 C.Y.	- 4,573.50
8.	Provide Water	206.1 MGAL	52.0 MGAL	- 4,623.00
10.	Seed	517 Lbs.	575.4 Lbs.	+ 759.20
11.	Fertilizer	2455 Lbs.	2350 Lbs.	- 131.25
12.	Mulch	73,800 Lbs.	82,170 Lbs.	+ 1,255.50
Sub-Total - Schedule II				+\$ 1,502.95
TOTAL CHANGE IN PRICE				+\$ 3,072.95

2. (cont'd)

Installation of electric fence (4) areas as staked in the field on the Melvin Stai property. The Department of State Lands has furnished all materials to be installed with the exception of the following, which are to be furnished by the Contractor at the noted prices:

	Actual Quantity	Cost/ Unit	Total Cost
1. Sears Diehard R/V Marine Deep Cycle Battery, 675 Cranking amps	4 EACH	\$120/EACH	\$ 480.00
2. Wood Terminal Posts, 6' long, treated min. 36", bury 30" min.	26 EACH	\$15.00/EACH	\$ 390.00
3. Install all Owner-provided materials, including gates, power sources and make all connections and electrical tests necessary re- sulting in a fully-charged electric fence installation (4 sites)	5648 L.F.	\$0.42/L.F.	\$2,372.16
4. Galvanized 2-3/8" O.D. Pipe Stand and ground for power boxes	16 L.F.	\$3.00/L.F.	<u>\$ 48.00</u>
	TOTAL		<u><u>\$3,290.16</u></u>

APPENDIX B

APPENDIX C

ANALYSIS OF PROFESSIONAL SERVICE FEES
DATE OF PREPARATION: September 24, 1987
PROJECT: BN-S Mine Project

PROFESSIONAL SERVICE AMOUNT

* Data Gathering, Site Evaluation, Preliminary Engineering, Final Engineering, Bidding Documents	\$36,486.66
* Construction Administration, Construction Inspection, Final Report Preparation	\$34,407.02

L.C. HANSON CO. COSTS	----- \$70,893.68 -----
-----------------------	-------------------------------

CONSTRUCTION COSTS	----- \$125,541.16 -----
--------------------	--------------------------------

PERCENTAGE ANALYSIS

PRE-CONST. LCH CO COST/CONSTRUCTION COST	29.06%
CONST. & POST CONST. LCH CO. COST/CONSTRUCTION COST	27.41%
TOTAL LCH CO. COST/CONSTRUCTION COST	56.47%

REMARKS: Services provided include lien determination, landowner consent, budget preparation, grant application, weed board approval, basic engineering, construction staking, contract administration, quantity accounting and full time resident inspection. This project involved four landowners, six separate mines, lengthy negotiations with one landowner and coordination with county officials for the road location. The construction phase extended over part of two construction seasons.
